DOCUMENT RESUME

ED 150 945 IR 004 524

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TITLE What Instructional Resources Can't Do and Shouldn't Try to Do.
PUB DATE 77
NOTE 53p.
AVAILABLE FROM Claire Gelinas, 27 Norwood St., Albany, New York 12203 (send self addressed, stamped envelope)

EDRS PRICE MF-$0.83 Plus Postage. HC Not Available from EDRS.
DESCRIPTORS Educational Assessment; Educational Resources; *Educational Technology; *Evaluation Criteria; Instructional Design; *Instructional Improvement; Instructional Media; *Instructional Technology; Needs Assessment; Objectives; Performance Based Education; *Resource Allocations; Teacher Role; *Teachers

ABSTRACT

This document is intended for teachers with some experience who have gone through the process of self-analysis to write adequate performance objectives and criterion-referenced test items correlated to these learning goals. The next step is to make available to learners a number of alternatives from which they may choose the most appropriate learning experiences. A brief discussion of needs that instructional technology is supposed to meet includes comparison of efforts and results. Instructional technology that meets teachers' needs is characterized as being self-training, self-evaluating, realistic, useful, boyproof, accessible, multi-area, student-motivating, learner-reinforcing, portable, storeable and soul-searching. The conclusion contains sections on technology as a key to gains and improvement, research management, and implementing ideas. (VT)

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TITLE:

# WHAT INSTRUCTIONAL RESOURCES CAN'T DO AND SHOULDN'T TRY TO DO

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OVERVIEW

EDUCATIONAL TECHNOLOGY -- A Perspective
- THE AUDIENCE FOR THIS DOCUMENT
- PRETEST OF BASIC ORIENTATION

BRIEF OVERVIEW

- A Few of the Needs that Instructional Technology Is Supposed to Meet
- A Comparison of Efforts and Results

TEACHERS WANT INSTRUCTIONAL TECHNOLOGY THAT MEETS THEIR NEEDS

- SELF-TRAINING
- SELF-EVALUATING
- REALISTIC (IN SIMULATING)
- USEFUL (FOR BOTH LARGE GROUPS AND FOR INDIVIDUALIZATION)
- BOYPROOF
- MULTI-AREA
- STUDENT-MOTIVATING
- LEARNER-REINFORCING
- PORTABLE AND STOREABLE
- SOUL-SEARCHING

CONTRASTING IMPRESSIONS AND HARD DATA

- Impressions
- Data Sources

CONCLUSION

- Technology as a Key to Gains and Improvement
- Research Management
- From Idea to Implementation

APPENDIX -- Technology and the New York City Job Market (NYS Dept. of Labor)

# EDUCATIONAL TECHNOLOGY

## A PERSPECTIVE

(1) When thinking of whether or not to use a particular piece of educational technology, it is well to ask :

- How clear is the goal I wish to attain?
- How will I know when I have attained it?
- How many alternate paths are open to me?
  - What can be better done by machinery and technology?
  - What can be better done by human brainpower and personality?

(2) No matter how you do it, you must be able and willing to recognize excellence whenever you see it no matter where it came from. This requires a description of the objective desired that is both ample and precise.

- Fuzzy ideas on what you want to do, to decide, or to collect will produce little more than role conflict.
- People who don't use the available data tend not to know what they need.
- Over-communicating can drown people and their new ideas in an ocean of data.
- It is hoped that the development of decision-making skills will be stressed more than the provision of "treatments" on a cookbook basis. People need to be aware of the possibilities of what they have to do.
- Money is now a scarce national and natural resource. This means people now have an open eye for competition and accountability.

## THE AUDIENCE FOR THIS DOCUMENT

In January of 1972, this document existed only in the form of 3x5 cards upon which were written certain key expressions to guide the author in telling teachers, who had written performance objectives and criterion referenced test items, "what to do next." Each time someone in the discussion group came up with a good idea the author wrote out a new card. Each time someone came up with an unanswerable objection, the deck of cards grew one card thicker.

After a while, there were too many cards to be used all at one time. It was necessary to sort them out. This is the origin of the main sections of this document.

READER PREREQUISITES : It is assumed that all readers of this material have successfully taught for at least two years. It is assumed that, no matter how successful they have been rated, they are still looking for better ways to teach.

READER OBJECTIVES IN READING : It is assumed that all readers of this document are familiar with task analysis. It is asssumed that each reader has actually gone through the agonizing process of self-analysis necessary to write adequate performance objectives and criterion-referenced test items correlated to these learning goals. Such a reader is now ready for the next step : he wants his learners to have available

to them a number of alternatives from which they may choose the most appropriate learning experiences. Teachers who set up clear cut goals and objectively validated examinations are not "unhappily married" to only one way of learning. Their pedagogical monogamy is interpreted in the more human sense of having "one" clearly stated objective and a variety of ways to get there. No matter how much they may love their subject matter, they still have room for spontaneity and creativity. After all, this makes learning (and teaching) more interesting.

WHAT THE TEACHER DOES : Among many other variables, teachers do at least two things : (1) they transmit information, skills, and attitudes and (2) they develop human interaction with their learners in a spontaneous and often unpredictable fashion. The ineffective teacher who does nothing but lecture without pausing for questions and clarifications is neglecting the human interaction aspect and probably is not doing a very good job of conveying information, skills, or desirable attitudes. The ineffective teacher who does nothing but talk on any topic without preparation and without systematic order may not be doing any better if he leaves the majority of his learners unsatisfied and uneducated.

WHAT TECHNOLOGY CAN'T DO : In this document, it is assumed that technology can provide no more human interaction than that provided by reading a book, watching TV, or reading the newspaper. There is some opportunity for human interaction, but it is much less than that afforded by a phone conversation which is at least an opportunity for two-way communication and interaction. Interacting with a computerized learning environment is not excluded here. It may provide more two-way communication

than reading a book, but its expense and its limitations render it less satisfying than sitting down and talking to a human teacher. Technology can't interact as well, as effectively, as spontaneously, or as individually as a human teacher can.

WHAT THE TEACHER CAN'T DO : Not all teachers have the time to interact with learners. If information must be conveyed without technology, if tests must be corrected by spending an hour or more per learner, if skills must be learned only by the artist apprentice approach, if attitudes must be dialogued with one learner at a time in sessions of three to four hours per learner, and if the teacher is over-worked in other inhuman ways, then the teacher will have neither the time nor the desire nor the energy to interact on a human level with all the learners in his classroom or in his course.

WHAT TECHNOLOGY SHOULDN'T TRY TO DO : Technology shouldn't try to replace teachers as human interaction agents. Closer analysis of responsive learning systems reveal that such expensive pieces of electronic machinery really do no more than save the teacher the trouble of saying to each learner such things as "Two times two is four, not five or three." This can be a significant gain in teacher time available for human level interaction.

Technology shouldn't do anything to replace a teacher without being certain that "teachers in general and this teacher in particular" will be willing to work in tandem in a man-machine-goal system. This means most teachers will accept computerization in the correction process for multiple choice questions but not in the correction of creativity and

spontaneity evaluation items. This means that most teachers will accept media and technology that relieve them of endless repetition of the same thing; they will not accept as readily media that take over the inspiration function of teaching. This means that most teachers will accept media that teach basic concepts and skills in a remedial framework; these same instructors will not use technology for the "higher" skills unless they have been shown with no doubt remaining that the "machine can do the job."

WHAT THE TEACHER SHOULDN'T TRY TO DO : Some teachers say, "No one gets into course 102 unless they take 101 under my personal supervision! I don't want unqualified learners in 102!"

Learners reply, "Why?"

Their reply can be interpreted as saying, "We will comply with any reasonable criterion referenced testing process to ascertain whether or not we have the skills possessed by the typical successful learner in 101. BUT we won't allow you to dictate how, when, or in what order we learn as long as we learn!"

Effective teachers reply to such learner challenges with (1) clear cut course objectives which can be learned inside or outside the traditional classroom, (2) relevant criterion referenced evaluation items whose standards and procedures are acceptable to both scholars (teachers) and the informed general public (learners), and (3) adaptable learning resources from which independent and aggressive learners can choose a well balanced and meaningful educational menu.

WHAT THIS DOCUMENT CAN'T DO : This document can't be read at one sitting. It isn't meant to tell you what to do.

___ It can't tell you if you are ready to read and apply it. (If you have any doubts here, take the PRETEST which follows this introduction.)

___ It can't decide the objectives of your course. (You must do this yourself. It will help if you learn what your professional confreres are doing.)

___ It can't show you how to write clearly expressed learning objectives that translate your personal goal statements into observable and learnable performances. (If you need help here, write in for more information.)

___ It can't write your performance based criterion evaluation items for you. (If you need help here, send us your present objectives and evaluation items. Send only a sample. We will give you some specific suggestions and show you what others are doing in the same course.)

___ It can't apply these general principles of effective technology to those learning resources you place at the disposition of your learners. (You should try to do this yourself. If you come up with extraordinary success or with insurmountable difficulties, then get in touch with us for an exchange of successful strategies.)

___ It can't tell you what to teach or how to teach. (However, it can make you aware that today's learner is not always willing to accept your approach as the only way to learn objective X. It can also make you aware that today's administrator is constantly comparing your effectiveness and your cost with that of various specimens of educational technology.)

___ It can't repeat too often the value of (a) active learning methods, (b) learner awareness of progress through continuous feedback, (c) evaluation in line with the objectives of the course, (d) cooperation among teachers and learners, and (e) anything which makes teachers and learners improve on their previous "best" performance.

## PRETEST OF BASIC ORIENTATION

This pretest is intended to help you set up a benchmark of your attitudes towards educational technology before you read this document. Do not agonize over your choice of yes or no. Choose one or the other. Don't be so fearful that you must leave the majority of the items undecided.

There is no correction key provided. This is done for a number of reasons. (1) There are no right or wrong answers. (2) It is more important for you to think out your response than to correct it with a nebulous norm always open to criticism. (3) These questions are intended more to provoke discussion than remediation. (4) If, at the end of your reading of this document, you have changed one or two of your responses, we would be interested in learning WHY and HOW?

PRETEST

GOALS (TARGETS)

1. YES NO The primary goal of the university is teaching.
2. YES NO The primary goal of occupational education is learning.
3. YES NO The primary goal of continuing education is learning how to learn.
4. YES NO Most teachers realize that educational administrators reward them more for good teaching than for any other single activity.
5. YES NO The single most important thing a teacher can do to implement learning among his students is to think through the objectives of his courses.
6. YES NO A rough topical outline is probably one of the best ways to communicate course objectives to the learners in one's classroom.
7. YES NO Professors have a tendency to prefer to work on research projects because this is one area in which "fuzzy and vague" goals are quite permissible since one never knows what one will find once a project is under way.
8. YES NO The most important thing for a professor or instructor to explicate in his course goals is the general type of subject matter he intends to teach.
9. YES NO Very few professors ask themselves, "What do I want my learners to know at the end of the semester?"
10. YES NO Only teachers in technical and trade programs should be expected to ask themselves, "What should my learners be able to do once they have attained mastery of the basic course objectives?"
11. YES NO Only the best teachers realize that education is not involved in changing learner behavior; they realize that education means teaching learners how to learn in a wide variety of circumstances.

EVALUATION (TESTS)

12. YES NO The only time learners should be exposed to performance examinations is during the final exam.

13. YES NO Giving more than two exams and one term paper is over-stressing the role of evaluation.

14. YES NO Giving a learner almost daily progress reports is going to unnerve him psychologically.

15. YES NO Continuous evaluation feedback will give most learners more agony than reinforcement.

16. YES NO In other words, evaluations which are frequent and which precede the final examination tend to befuddle and confuse learners.

17. YES NO Evaluations have for their purpose the grading of measurable learner achievement.

18. YES NO Any type of evaluation which enables the learner to correct his behavior is dangerous since it is quite akin to teaching to the final exam.

19. YES NO A teacher would be better off if he passed out his course evaluation forms every weekend rather than wait until the end of the course.

20. YES NO The typical professor is not an expert in his own subject matter discipline.

21. YES NO The typical occupational instructor has spent his entire life teaching; he does not usually have much practical experience in working in a non-teaching job which demands the application of what he is teaching.

22. YES NO The typical teacher is quite often aware of the specific deficiencies of his teaching style, methods, and classroom performance.

23. YES NO In order to instill the highest possible standards of craftsmanship in learners, teachers must maintain a certain professional distance from learners.

24. YES NO Cooperation is a very emotionally appealing model for the relationship between teacher and learners. However, it is defective in that it underestimates the importance of the teacher in the learning process.

RESOURCES

(TECHNOLOGY)

25. YES NO Sitting passively in front of a television set for a televised presentation on optics is just as ineffective as sitting passively in a large lecture hall listening to a teacher discoursing on optics.

26. YES NO In other words, the lecture is never justified as a vehicle of worthwhile learning.

27. YES NO The only advantage to the lecture system is that it gives learners the opportunity to (a) exchange ideas with the professor and with peers, (b) ask questions that have arisen in the course of their personal investigations, (c) suggest technical problems that could be analyzed in a large group framework, (d) evaluate and interpret their ability to take notes in a normal human setting, and (e) develop their ability to discover the kernel of truth in even the worst oral presentation.

28. YES NO No matter how much we may dislike it, we must accept the lecture method since it is the one most frequently used by the typical Ph.D.

29. YES NO With this in mind, our goal should be more to "improve" the typical lecture rather than "supplement" it with educational technology.

30. YES NO Educational technology is defined as the minimum of machinery necessary to effectively attain prespecified educational objectives.

31. YES NO It is up to the individual professor to come up with the one method that works best for all the students under his tutelage.

32. YES NO Any learning system that would allow learners to choose among options is doomed to failure since it is the teacher (the man who knows his subject matter) who should choose what is most appropriate for any individual learner.

33. YES NO Since most teachers know very little about learning curves, individual differences, personality traits, the learning process, the learning environment, behavioral psychology, learner interests, career aspirations of non-intellectuals, or developmental psychology, they must be recycled and sent back to graduate school for intensive post-doctoral training in these areas.

## A FEW OF THE NEEDS THAT INSTRUCTIONAL TECHNOLOGY IS SUPPOSED TO MEET

Teachers are on the look-out for technology that will make their job easier and more effective. They do not want to become systems engineers every time they need the help of applied know-how.

**TEACHING DIFFICULTY** →

A. Many teachers are at a loss as to what to do when they are assigned learners with :

- low IQ
- little previous skill
- no prerequisites
- hostile attitudes
- apparent unwillingness to learn
- past histories of failure

**TECHNOLOGY DEFICIENCY** →

B. Such teachers would like to receive in the mail each day

- objectives
- resources
- tests

clearly relevant and useful to the lesson at hand. This is how many teachers think of technology. Their dream is not presently realized.

**TEACHING TECHNOLOGY DEMANDS** →

C. They want technology that is

- self-training
- self-evaluating
- realistic (in simulating)
- useful (for large groups and for individualization)
- boyproof
- multi-area
- student-motivating
- learner-reinforcing
- portable and storeable
- soul-searching

## A COMPARISON OF EFFORTS AND RESULTS

EFFORTS -- The field of instructional technology, even when it was still called audio-visual instruction, consumed large amounts of :

- Money
- Planning
- Expert consultation
- Teacher time

RESULTS -- Not everyone has been happy with the results in spite of the numerous break-throughs achieved with the assistance of technology. Nowadays, educators realize that hardware, software, and money need much coordination to make significant educational impacts.

| | |
|---|---|
| NAIVE TEACHERS | Expected too much |
| EXPERT TEACHERS | Mistrusted too much any claims that a machine could take over any of their specialized tasks |
| HIGHLY FLUENT AND DRAMATIC LECTURERS | Never doubted for a minute that they could out-do, out-talk, out-individualize, and out-teach any audio-visual device in existence |
| OVERWORKED TEACHERS | Complained that, even though they wanted more technology, there simply was not enough time to take on the extra load |
| LAZY TEACHERS | Misused enough technology often enough that sullen students rose up in protest |
| IMPATIENT TEACHERS | Went so far out on a limb that it was easy to see how their technology costs outdistanced both their lifespan and their objective attaining effectiveness |
| THEORETICAL TEACHERS | Were all thumbs when it came to anything more complicated than the traditional off/on switch |

| | |
|---|---|
| GOOD TEACHERS | Said, "Show me how it works," instead of demanding, "Exactly what can it do better than I can." It didn't take them long to find out that technology couldn't do everything the typical teacher could. |
| ADMINISTRATORS | Shouted in unison, "We want more productivity" and "We haven't enough money for any new fangled ideas." Some of them never did see the contradiction in what they said and did. Somehow, productivity was simply and simplistically defined as "More and more." |
| DEDICATED TEACHERS | Wanted more personal contacts with students and learners. Unfortunately, they defined personal contact as meaning "Less learners per teacher." |
| TAXPAYERS | Looked at all this and said, "If you increase my taxes, I'll increase your accountability." |
| PROFESSIONAL EDUCATORS | Misunderstood their mandate to cut expenses as a direct order to cut teacher salaries wherever possible. Somehow, no one ever thought of the wide variety of alternatives to attain educational objectives at a lower cost with equal or better quality. |
| SUCCESSFUL TECHNOLOGY APPLICATORS | Seem to have come up with a very easy to understand motto : the maximum of learning with a minimum of cost. Cost can be equated with time of preparation, with difficulty of operation, and with danger of breakdown. |

TEACHERS
WANT
INSTRUCTIONAL
TECHNOLOGY
(I.T.)
THAT MEETS
THEIR NEEDS

1.

IS IT

SELF-TRAINING?

- The typical teacher wants to "steal" ideas and innovations that have been "proven" to work elsewhere and seem applicable to his particular situation.
  - He wants to push a button and sit back to see what happens next. Then, he'll commit himself.
  - He wants to appear sophisticated, but he wants unsophisticated directions on how to use it.
  - Most teachers teach "two areas," one he knows and one he half knows.
    - For the area he completely knows, no curriculum guide will ever influence him. For the area he half knows, no curriculum guide will ever provide all the help he needs and wants.
    - These teachers need to get started on the right track. Once they get going, nothing stops them.
- Simple ideas couched in terminology that "bugs" them will never get a fair hearing. Keep it simple and sweet.
  - Most teachers have no experienced communications expert back home to help them out.
  - Many get bogged down by the constant need to define terminology, e.g.,"What is technology anyhow?"
- Technology must never be seen as merely an "add-on" gimmick. It must be seen as an integral part of education.

2.

IS IT

SELF-EVALUATING?

- Any technology that ties up the teacher in such things as routine corrections of the same exercise for each student will never be accepted. Teachers use machinery to save time and effort.
  - Effectiveness and efficiency must result each time technology is used in the learning process.
  - The same thing applies to record keeping. As early as the 17th century, Leibnitz remarked, "It is unworthy of excellent men to lose hours like slaves in the labor of calculation." This is the way teachers feel about unnecessary bookkeeping.
  - Instructors like technology that is easy to check.
- More important than teacher convenience is the ability to produce DEMONSTRABLE RESULTS.
  - Both teacher and learner want to know, "How am I doing?"
    - TARGETS (or goals or objectives) must be
      - crystal clear
      - relevant
      - attainable
    - TESTS (or evaluation instruments) must be capable of

      MEASURING the progress of

      individuals
      the group
      the teacher

      PINPOINTING

      learner weaknesses
      group prerequisites
      successful teacher tactics
  - This is accomplished by technology which stresses the next step for individual learners, a variety of uses for the group, and learning how to learn for a lifelong adventure.

## 3. IS IT REALISTIC (IN SIMULATING)?

- Any learning tool that is too easy will insult more than it will instruct.
- On the other hand, any learning tool that is too complicated will sit on the shelf and gather dust. This dilemma is not an easy one to resolve.
  - Today's students have had much first hand experience with applied technology. Television, space crafts, and computers are found in the newspapers today, and not in science fiction sections.
  - Designers of technology need to understand the "customer" by placing themselves in their shoes.
    - Barriers need to be broken down.
    - Learners want to get down to "cases" after a study of general principles. The applications become more obvious after one has been exposed to a few samples.
  - Nowadays, a know-it-all attitude is neither acceptable nor possible. There is too much to know.
- Teachers tend to realize that what they learned on the job may now be out-of-date. They want to know what and how to teach the most up-to-date materials and methods possible.
  - This is why they need feedback from the same trade.
  - They want ideas that will
    - WORK in the classroom
    - WORK on the job -- THE REAL THING
    - LIVE UP to field standards and specifications.

**4.**

**IS IT**

**USEFUL**

**(FOR BOTH**

**LARGE GROUPS**

**AND FOR**

**INDIVIDUALIZATION?)**

- For the teacher, these demands are not contradictory.
  - They stress the dual nature of teaching.
    - The Group
    - The Individual
  - Going beyond the "one body" theory of each learner for himself, teachers realize that group spirit ("several bodies") can influence overall achievement.
- At the moment, there is no central location where teachers in need of technology can find a stockpile of catalogued and validated resources tied in with with specific learning targets.
  - Cost economy is only one criterion.
  - Group fit is even more important.
  - Reasonable time limits mean that materials must be available with short turnabout time.
- A learning resource which would be too expensive with only one learning from it can be funded if it will help several learners in the same school or in the same region.

## 5. IS IT BOYPROOF?

- Boyproof means that any piece of machinery or apparatus is not subject to dismantlement or destruction by a youngster who starts "messing around" with it.
    - Student-paced materials avoid this problem by keeping the student happy with his results. Contented learners will not damage a source of satisfaction.
    - Provided no one kicks in the picture tube, televised lessons can be brought under tight cost controls, 1¢ per child per hour or less.
    - Armed guards are no answer. Instructional technology is meant to be manipulated by learners. Placing "Don't Touch" signs around the learning environment may be tantamount to implying, "Don't Learn. Do nothing but look."
- Boyproof is accountability's way of telling you the teacher that you are responsible to each and every boy and girl in your classroom.
    - Merely dreaming up a piece of learning technology in no way assures that it will be used the way you intended it to be.
    - This time-consuming task shouldn't turn you off because any instructional resource you bring to the boyproof stage is also on the LEARNABLE level.
    - Such a prescription applies to anyting you use to attain objectives : textbooks, films, your own materials, commercial resources, or hardware of any kind.

**6. IS IT MULTI-AREA?**

- Flexibility is needed to make any piece of machinery suitable for adaptation and diversification.
    - Breadth of coverage and applicability must never be used as an excuse for shallowness of content worth.
    - Money is a scarce natural resource. Pinches and numerous cutbacks make it imperative to get "two dollars worth" for every $1.
- SALESMANSHIP enables a successful teacher to spread the good news every time he finds something that works.
    - Something that works for one teacher can work for another teacher in an entirely different discipline once they both get together in a congenial setting away from the pressures of the "school."
    - Teachers want specific solution to very specific problems. They can forget that there are only so many different possibilities even in other fields.
- SUPPLEMENTS to existing resources are always welcome.
    - Teachers need to look in a wide variety of places to come up with fresh ideas.
    - Every teacher has a few ideas that he cherishes. These moments of glory make him sure that no machine can ever replace him. Part of the irony is that it is precisely these moments of successful teaching that could be adapted to a larger audience through instructional technology and other media.

7.

IS IT

STUDENT-

MOTIVATING?

- In even the best run trade program, the learner is no more than an "unpaid laborer" until we start to reckon "psychological compensation."
    - This makes dull, unimaginative, and unprepared lessons doubly ineffective.
    - Unless the materials of instruction and the machines of instructional technology are seen as extensions of man and of men, many technological resources will remain on the unreal and the inhumane level.
- THE HUMAN MIND responds to materials and machinery.
- THE HUMAN SPIRIT responds to other men.
- COMMITMENT implies that one person has a relationship with another. This means caring deeply, perhaps passionately, about learners.
    - It is the presence of learners learning that makes teaching exciting, challenging, and truly professional.
    - The technology is merely one way to get to this objective.
- HARD WORK means building up successful teaching tactics and successful learning tactics on small daily successes.

  Somedays, this will lead to tremendous fulfillment and excitement.

  But this itself can be a prelude to fatigue, discouragement, and doubts. Growth has many signs.

8.

IS IT

LEARNER-

REINFORCING?

- UNSUCCESSFUL LEARNERS, unlike unsuccessful workers, can't be fired. Yet, standards must be kept up.
  - The question, "Does HE have enough practice?" is not properly the task of the teacher. He has too many students to be tied down to check-listing each and every one.
  - REINFORCEMENT means that the learner can take care of his own evaluation and his own rewards system.
  - WORKERS work eight hours a day. The beginning student will only be confused if forced to meet this standard without gradual and intelligent preparation.
- TIME STANDARDS AND DEXTERITY are not based upon whim.
  - The teacher allows the learner to do a good job from the learner's point of view.
  - The next step is competition with class standards and norms.
  - Eventually, one thinks of what is necessary to get a job.
  - The employer will think in terms of asking, "Does this part-time student do enough to justify my paying him "x" dollars per hour." This is part of REALITY-SHOCK.
- INDIVIDUAL WEAKNESSES must be shored up one at a time.
  - Learners can improve "good" jobs.
  - Learners can become workers.

9.

IS IT

PORTABLE

AND

STOREABLE?

- SAFETY AND FRESHNESS demand that any apparatus be visible only when it is being used for teaching and/or learning.
    - Storage is usually at a premium in the typical school.
    - Students working on a car motor do not always need the whole car.
- ACCESSIBILITY is an important consideration.
    - The typical teacher is too busy to chase all over town for a fifteen minute demonstration.
    - Convenience of the learner is just as important a consideration.
- PORTABILITY can be carried to excess.
    - However, experiments which placed basic information on 3 x 5 cards found out that these portable items were more often used than more complete but less portable books.
    - Reducing gigantic problems to portable solutions forces the teacher to "put in the extra effort necessary for success."

10.

IS IT

SOUL-

SEARCHING?

- CRITICAL demands pick the expert apart.
    - "Get them thinking!" is the implicit goal behind every rational use of technology.
    - Industrial standards are only one example.
    - Understanding the customer is one way to update an otherwise satisfactory job.
    - This does more than "telling someone else exactly what to do." Critical reactions get both of you involved in learning.
- SOUL gives a lot of life and enthusiasm.
    - The present dearth of readily available and applicable instructional resources force the teacher to "make it himself." There is simply no place to "buy it."
    - It creates a better environment for learning and creativity.
    - It entrains learners in the process of becoming self-sufficient and productive.
- ACTIVE INVOLVEMENT is one of the better ways to learn.

## CONTRASTING IMPRESSIONS AND HARD DATA

IMPRESSION 1: Technology Can Replace Teachers and Turn Education Into a Mass-Producting Albeit Individually Customizing Semi-Automated Service

Data Source 1: Some Things Some Teachers Teach Have Been Better Achieved by Goal-Oriented Technology

IMPRESSION 2: Instruction Technology is Necessary Because Much Information Must Be Pumped into Human Learners in a Short Period of Time

Data Source 2: Humans Use Their Intelligence to Go Beyond the Limited Data Presented to Them

IMPRESSION 3: Lack of Funds Is the Largest Single Obstacle to Implementing Presently Feasible Instructional Technology Systems

Data Source 3: Not Too Much Data is Presently Available on Which Education Goals Can be Better Attained by Technology and Which Educational Goals Can Be Better Attained by Human Teachers

IMPRESSION 4: With Proper Technological Instrumentation Almost Anybody Will be Able to Teach Almost Anything to Almost Anyone of Any Ability Level

Data Source 4: Making Teachers Aware of the Possibilities of Instructional Technology Has Done More to Improve Learning in the Classroom and Outside the Classroom than the Provision of Hardware and Software on a Cookbook Basis Which Doesn't Involve the Teacher in Planning, Research, and Development

IMPRESSION 5: Only an Individual Teacher Can Design and Develop Instructional Media That Will Fit in with His Teaching Style and the Learning Sytles of His Students

Data Source 5: Instructional technology has been developed that is (1) correlated with a precise teacher-chosen objective, (2) auto-instructional, (3) self-evaluating, (4) applicable to large numbers of students, (5) boyproof, (6) easily portable, (7) student-reinforcing, (8) realistic in simulation and presentation.

# TECHNOLOGY AS A KEY TO GAINS AND IMPROVEMENT

## Introduction

1. T.V. in the doldrums is not the best way to introduce technology.

2. Release from the classroom atmosphere is a better use of technology but there is much more to consider.

## A Few Examples

3. A maximum of teaching and learning with a minimum of machinery is the heart of Educational Technology.

4. Living room school day care centers can do more than babysitting.

5. Summer T.V. high school remediation programs must zero in on specific learner needs.

6. Technological weapons that outdistance pilot training do not produce maximum results. The same is true for technology and teachers.

## Principles of Application

7. Machines motivate non-verbal learners.

8. On-camera learners are the center of attention.

9. Underachievers can move up to realistic expectations.

10. Psychological learning problems can be by-passed by success that improves attitude.

11. Software moves from commercially prepared to teacher prepared to student prepared.

12. Game atmospheres can activate latent basic skills.

13. Competing with teachers and imitating them is often enough to increase learner progress and teacher productivity.

14. This means that instruction, supervision, leadership, evaluation, and other "teacher filters" are not the only productive sources of gains scores.

15. For example, evaluation by replaying a videotape can let the learner "see himself as others see him." This doesn't have to happen in the classroom with unnecessary witnesses. Four learners may be enough.

16. Teachers shouldn't be forced into using technology. A successful strategy will be talked about and sought out by alert educators.

17. Non-writers can take pictures and put together a scrapbook. They'll be able to talk about what they've learned by observing.

18. For a visualization of the gains score, videotape the learners the first day and hide the tapes till it's time to evaluate visible progress.

19. Instead of talking about career development, start showing learners interesting things they can do.

20. We get a rapid start-up when we provide the software. We get long range growth when teachers and learners take charge of production.

21. Not all learning technology is best used in the typical classroom. Placing it in a separate room or in an open classroom atmosphere is a move in the right direction.

22. Teachers will be sold on new approaches when visible learner progress back up the claims of abstract statistics.

23. Boyproof technology can't be damaged by the typical careless and non-malicious learner. We need boyproof materials so we can allow learners to learn on their own.

## PREPARATION OF SOFTWARE

1. Pick a topic
2. Do research
3. Prepare pictures
4. Write script
5. Practice reading script
6. Record a run through
7. Evaluate
8. Final tape

Selling Job

We need to document anecdotal testimonials with hard data.

PICK A TOPIC
WRITE A SCRIPT
EVALUATE THE TAPE
DO RESEARCH
PRACTICE READING THE SCRIPT
MAKE A FINAL TAPE
PREPARE PICTURES
RECORD A RUNTHROUGH

PICK A TOPIC
WRITE A SCRIPT
EVALUATE THE TAPE
DO RESEARCH
PRACTICE READING THE SCRIPT
MAKE A FINAL TAPE
PREPARE PICTURES
RECORD A RUNTHROUGH
DISCOVERY OF AMERICA
DISCOVERY OF AMERICA
DISCOVERY OF AMERICA

# WHAT INSTRUCTIONAL RESOURCES CAN'T DO AND SHOULDN'T TRY TO DO

## RESEARCH MANAGEMENT

Money is normally tied to specific funds designated for particular purposes. When a number of budget accounts develop, the temptation is to marry individual personnel to one or two fund numbers. This facilitates bookkeeping, but it ties up staff unnecessarily. The expert in project 175 may be just the person to help out program 294. The bookkeeping of pro-rating services is almost prohibitive. One simple solution would be to mingle staff while keeping the accounts separate. This should be done on an equal sharing give-and-take basis.

School districts need someone to come in and size up the situation. They want someone to come in, to listen, and to design research that can make an impact on local problems. When these skills are available on a "when needed" basis, schools can intensify their research without overloading their budgets. Having top people on a central staff that services many districts is a good way to deliver product while planning for change.

A typical example may clarify how specialized staff and local needs can dovetail. The local staff asks, "Where are we and where are we going?" The experts from the central office become consultants in residence who don't cost too much but who do a lot. They help clarify the answers to "How are we going to get there?" This is done without saddling an independent district with staff they can't afford. The central bureau that is seen as a source of available and helpful assistance is more highly esteemed than the "head-quarters" that "issues edicts and checks up" at the busiest times of the year.

The idea is not to do things that could be done by local personnel. Every plan to use central experts must be tooled in such a way as to "spin

off." This means helping someone who is perplexed in such a way that, after a while, he can take over and run the whole show. When local staff can't do the job, the tactic advocated is to train them. This attains better and more lasting results then merely lending a helping hand that never goes away. A hungry man is given food, but what he needs even more is the ability and skill to provide for himself.

The thrill of doing something that has meaning and involvement must be kept in control. Once the idea is planted, someone else must be able to carry it on. It's like raising a child. Eventually, he must be on his own.

TWO TERMS

| | LOCAL | FOCAL |
|---|---|---|
| Problems | Those needs that are perceived by inhabitants of a specific environment. | Concerns that reflect the universal human dimensions fround everywhere. |
| Staff | The professional and non-professional personnel presently in function and on the job. | Outsiders who come to act as "spark plugs" till the rusty local motors start to turn over. |

## FROM IDEA TO IMPLEMENTATION

LEARNING THEORY DATA

| Term | Phenomenon |
|---|---|
| Levels | Some learn more, better, and differently than others. |
| Stages | Most start with the simple and move on to the complex. |
| Pacing | Each one has his own timing, rhythm, and rate of learning. |
| Impatience | There are times when a person is ready and eager to learn even though he doesn't always learn then. |

LEARNING PRACTICE CYCLE

| Phase | Process | Product |
|---|---|---|
| Touch | Experience | Repetition (New) |
| Pause | Interiorize | Pattern (Old) |
| Play | Exteriorize | Coordination (Easy) |
| Talk | Socialize | Belongingness (Valuable) |

1. This model tried to explain the human mind and the human spirit. It is only "a" model. It could help implant kindness as well as math, it could uproot strifle as well as errors.
2. Such an approach envisions learners saying, "Look what we've learned!" rather than "We've been well taught!" This implies a shift:
   (a) <u>from</u> knowledge <u>to</u> ways of knowing,
   (b) <u>from</u> attitudes <u>to</u> feelings, and
   (c) <u>from</u> doing <u>to</u> creating.

TEACHERS
WHO
USE IT
WANT
TECHNOLOGY
THAT IS

1. SELF-TRAINING
2. SELF-EVALUATING
3. REALISTIC (IN SIMULATING)
4. USEFUL (BOTH FOR LARGE GROUPS AND FOR INDIVIDUALIZATION)
5. BOYPROOF
6. MULTI-AREA
7. STUDENT-MOTIVATING
8. LEARNER-REINFORCING
9. PORTABLE AND STOREABLE
10. SOUL-SEARCHING

TEACHERS

WHO

USE IT

WANT

TESTS THAT

| MEASURE progress of | individuals | the group | the teacher |
|---|---|---|---|
| PINPOINT | weaknesses | prerequisites | successful tactics |
| STRESS | the next step | a variety of uses | learning how to learn |
| CORRELATE with | prespecified objectives | learnable skills | significant attitudes |

A FACILITATOR

- Offers help and assistance,
- Stimulates the learner to grow, and
- Provides a relaxed atmosphere.

Learners learn

- in different ways,
- at different ways,
- in different circumstances,
- with different results, and
- for different reasons.

To get an impression of what technological changes are occurring or are on the way in the City's industries and how these changes are affecting manpower requirements, workers' job duties and the local job situation, the local offices of the Employment Service periodically check with employers in the City. The outstanding finding of this periodic review is that, in a City as diversified as New York, changes are always taking place but rarely do they occur rapidly enough to affect large groups of workers in a short period of time.

In retailing, the big news, in addition to EDP controls of inventory, is the point-of-sale registers and credit approval terminals. This equipment, not yet in use to any great degree, probably won't cut the number of sales clerks needed(and therefore the total labor cost),but in shortening the time required to register a sale, will increase the productivity of the sales clerks and so cut the labor costs per sales dollar. Increased efficiency should be a boon to both the stores and the shoppers--the store's profits should be higher and the customers should get better service.

The influx of numerically-controlled machine tools varies greatly from firm to firm, but on the whole there hasn't been any widespread introduction of this equipment in local firms. These machine tools are expensive and the level of orders during the last few years hasn't warranted their purchase;also,it seems that these tools aren't suitable for use in the small shops which characterize the industry in the City. Among those firms which have installed numerically-controlled machine tools, there seems to be the feeling that they perform the job they are designed to do; one firm reports that it has cut down on its need for machinists, an occupation in which it is frequently difficult to recruit qualified workers.

Several warehouse operators have installed automatic conveyor belts to improve material handling; the savings in manpower costs run into substantial amounts.

A number of commercial bakeries have installed automatic mixing machines and other new equipment;in all cases where new equipment has been introduced,there has been no loss of jobs, but the workers were shifted to other slots in the plant. While this isn't a trimming of staff in itself, this makes potential job openings rare. Automation and mechanization in the entire food processing field has been proceeding rapidly.

An indirect technological factor causing reductions in manpower requirements and rough sledding for many employers is the introduction of and widespread acceptance of "wash and wear" fabrics and synthetic knit fabrics. The volume of business in many laundries and dry cleaners has declined over the last few years, and many operators have thrown in the towel. The number of laundries and dry cleaners in the City declined from 3,400 in 1965 to 2,800 in the second quarter of 1971.

The old radio line of "Duffy's tavern, Duffy ain't here" may be reality in the future. A new electronic machine is available that pours a precisely measured quantity of alcohol at the touch of a button.It can be wired to the cash register to print bar checks, and it prepares several types of mixed drinks from a spigot which can be dialed to deliver a regular, dry or extra-dry martini. This equipment can dispense seven drinks in less than ten seconds.

In the apparel industry, several changes are occurring in processes and technology. One development which has received a lot of publicity is the use of a laser beam to cut cloth along lines previously designated by a computer. Some experts in the field feel that this type of equipment will not be suitable for the small shops which make up the garment industry in New York City. Other new developments include a new snap-on interchangeable button system for general apparel and uniforms; industry sources and the general press have referred to this as a change as revolutionary to the industry as was the zipper. Another breakthrough is the heat transfer printing of a design from paper to fabric, a process which is becoming very popular.

Many in-house procedures in hotels may be subject to change in the future. Consoles which control room vacancies, advise the head chambermaid when a room can be made up, etc., are on board in some hotels. Others are experimenting with equipment which will make it possible for them to know when a television set plug has been removed from the wall so that they may investigate. Television monitors which enable the operator to see halls and other areas of the hotel are coming into greater use. The combination of telephonic equipment and computers enables some hotel chains to instantly confirm reservations in any of their hotels around the world. A potential guest dials the same telephone number from any part of the country, toll-free, and can reserve a room in any of the chain's hotels.

Restaurant kitchens may start going in for more new equipment which may enable them to cook a meal to order in just a few seconds compared with the time required now. The introduction of this equipment, of course, may depend to a great degree on the type of operation being run. If quick turnover at the tables is essential, this equipment will do the trick; but if the restaurateur is interested in selling the fringes that go with a good meal, this may not be his cup of tea. Another development in restaurants is the introduction of super-compactors for garbage that reduce the size of the waste package to one-tenth of the usual size; this could be a big cost-saver for those restaurants that pay for commercial sanitation services.

These last two pages of data on technology and the New York City job market come from the NYS Department of Labor. They give us food for thought.

Typical Applications

- Should tests be used to evaluate primarily :
  - individual students, or
  - the curriculum and its effectiveness?
- In the later case, this means asking :
  - Does the lesson achieve its predetermined goal?

# EDUCATION TECHNOLOGY:
# A SUBDIVISION OF EDUCATIONAL ALTERNATIVES

Directions

The following items appearing in multiple choice format are intended to provoke discussion. Merely coming up with the alternative you consider the right answer is not enough to get a perfect score on these questions. The more you discuss and the more you apply this material, the better will be your score.

Section 1.00 A Miscellany of Educational Alternatives

____ 1.01 A book is a long-lived example of educational technology. This was realized by Thomas Carlyle who said in 1847 in his book, Heroes and Hero Worship,

A. "A true university is a collection of students"

B. "A true university is a collection of teachers"

C. "A true university is a collection of dormitories"

D. "A true university is a collection of books"

E. "A true university requires machinery to succeed"

___ 1.02 The book is a phenomenon all unto itself. Which of the following statements is most true?

A. Most books concentrate on only one subject

B. Most books cover a wide variety of subject matter

C. Most audio-visual media cover a wide variety of subject matter

D. A successful book must be written to a highly limited audience

___ 1.03 A book ("Education by Reading") and educational television ("Education at a Distance") have which of the following in common?

A. Both require the presence of a teacher to be with the student

B. Neither of them has any relationship to a teacher or a professor

C. Students can learn from both of these without the physical presence of a teacher

D. Just as the book replaced the professor, so will television replace the book

___ 1.04 Which of the following terms rates highest on your scale of values?

A. A bookcase

B. A library

C. A media center

D. A learning resources center

E. A book

____ 1.05 Around the year 1800, which of the following questions helped eliminate the practice of bleeding from the medical profession?

A. "Can we find something easier for the doctor to do?"

B. "Can we find something easier for the patient to do?"

C. "Does bleeding do any good for the patient?"

D. "Is it a socially acceptable idea to bleed people?"

E. "What did our medical professors say about the benefits of bleeding?"

____ 1.06 Try a little experiment with yourself. Put your hands together in front of your chin. Notice which thumb is on top. Unclasp your hands and try to reverse the order. Put the other thumb on top. How does it feel?

A. It's a very exciting feeling to do something differently

B. It's uncomfortable to do something in a manner to which we are not accustomed

C. It's strictly impossible to perform this change

D. This type of change can only be performed by a contortionist

E. Such physical manipulations are simply a waste of time and a distraction from the present discussion

___ 1.07 Which of the following situations is typical of the way course objectives are written?

A. The professor spells out the general objectives of the course and never allows for individual differences

B. The professor spells out the general objectives of the course and leaves enough room for individual differences

C. The learners spell out the objectives of the course and tells the teacher what they want

D. The learner spells out the objectives of the course and simply quits the course if the teacher doesn't met his expectations

___ 1.08 When a great deal of planning goes on in central headquarters in order to come up with the specifications, objectives, and procedures to be employed in locally based centers, which of the following is probably true?

A. The people in local centers become people who follow directions

B. The personnel in the local centers become idea-men who have an impact on the philosophy of the general headquarters

C. There is no communications whatsoever in either direction between headquarters and the local learning center

D. Discoveries which are found to be successful in a locally planned learning center are transmitted to central headquarters for use elsewhere

E. A better learning situation results since the people in central headquarters have a more profound overview of the local requirements

___ 1.09 Which of the following is necessary to benefit from the experience of goal setting?

A. A sense of obedience

B. A spirit of rebellion

C. An inherent sense of purpose; a feeling of being goal-directed in the world

D. The ability to leave things to chance

E. The ability to change direction while ignoring one's environment or one's audience

___ 1.10 Anyone who claims that the major priority of quality education is the maximum amount of learning in the minimum amount of time with the optimum use of technology is probably not

A. Teacher-centered

B. Student-centered

C. Textbook-centered

D. Technology-centered

E. High I.Q.-centered

___ 1.11 Human values must be determined by

A. Scientists

B. Specialists

C. Generalists

D. Human beings

E. School administors

Education Technology:

A Subdivision of Educational Alternatives

1.00 - D - Miscellany of alternatives

1.01 - D - Carlyle

1.02 - B - Book

1.03 - C - Book and television

1.04 - D - Scale

1.05 - C - Bleed

1.06 - B - Clasp

1.07 - B - Who writes objectives?

1.08 - B - Local autonomy

1.09 - C - Goal-setting

1.10 - B - Maximum, Minimum, and Optimum

1.11 - D - Values

OBJECTIVES FOR E.P.D.A. WORKSHOP AT HVCC, JUNE 30, 1971

As a result of the workshop on this date, participants will:

1. Reinforce previous knowledge of learning resources and become aware of some newer media or educational technology by taking and scoring a pre-test to identify entry level.

2. At the end of the session, be able to identify or describe 20 generic types of media, 5 selection aides, and 5 learning strategies based upon models discussed during the presentation, in post-testing.

3. Apply learned and validated expertise in selecting appropriate media for specific behavioral tasks in design of the Institute problems as a result of successfully relating Media Functions and Stimuli to formats in a workshop exercise.

4. Use selection tools for print and non print media.

5. Demonstrate lessened anxiety or hostility toward non-traditional learning patterns by integrating learning resources as positive reinforcers of expected learning tasks or as stimuli for operant behavior as they work with behavioral objectives July 1-2, and in project development the final two weeks of the Institute.

6. Take and score post-test to measure achievement of Objective 2.

7. Provide consultant with feedback to help in evaluation of this component of the Institute.